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Conference Objectives

by John B. Moran*

The past and current EPA research and regulatory programs as they relate to nonregulated emissions from light-duty motor vehicles are reviewed. Provisions of Sections 202(a) and 211 of the 1970 Clean Air Act Amendments are discussed and their relationships to the nonregulated emissions issue detailed. The EPA position regarding nonregulated emissions from oxidation catalyst-equipped vehicles is discussed and related to technical papers presented in this symposium. The planned EPA research programs addressing the "catalyst" issue are reviewed.

Why are we here today? An eleventh-hour crisis has arisen regarding potential public health hazards incurred in the control of regulated emissions from mobile sources. These hazards result directly from application of technology developed by the auto industry to achieve those regulated standards. The problem is not new today, it has been with us for more than a year. As seems typical of our society, we have been unable to deal with this problem in basic moral or technical terms. In the final analysis, the problem deals with public health trade-offs. The issue is complex, difficult to assess before-the-fact, and perhaps most important and unfortunate, is likely keyed to the basic underlying motivation of our industrial society for which "profit" is the only apparent index of performance.

We are here today to review, at least our current state of knowledge, and to discuss the known technical facets of the issue in order to address the key question: "Will the use of oxidation catalysts result in a net benefit to the public health?" The roles which we, as scientists, play must hinge upon what objectives we, individually and collectively, have in mind for society. Our role will be judged, at least in part, by our ability to deal with the issues being discussed here this week.

Five major areas will be reviewed in this symposium: (1) perspective of the problem; (2) noble metals; (3) emissions and measurement methods; (4) control options/methods; and (5) overview presentations.

Each of these areas is to be handled in a separate session. It is the objective of this discussion to establish why these separate sessions have been identified and to provide, herein, the relationship between them. Further, I shall review the legislative/regulatory aspects of the EPA program as it relates to the nonregulated emissions issue.

The basic theme which underlies the EPA-ORD program has been stated elsewhere, but should properly be reviewed again at this point for your emphasis.

> "EPA must assure that measures used to reduce those emissions which are specifically regulated by the Clean Air Act do not, in turn, increase harmful emissions from motor vehicles that are not now specifically regulated."

Legislative Background

The 1970 Clean Air Act Amendments provided the basis for emission standards relative to CO, HC, and NO_x, and established time schedules for compliance with those

* Environmental Protection Agency, National Environmental Research Center, Research Triangle Park, North Carolina 27711.

standards. Specifically, Section 202(b)(1)(A) and (B) of Title II—Emission Standards for Moving Sources states:

> "(b)(1)(A) The regulations under subsection (a) applicable to emissions of carbon monoxide and hydrocarbons from light duty vehicles and engines manufactured during or after model year 1975 shall contain standards which require a reduction of at least 90 per centum from emissions of carbon monoxide and hydrocarbons allowable under the standards under this section applicable to light duty vehicles and engines manufactured in model year 1970."
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> "(B) The regulations under subsection (a) applicable to emissions of oxides of nitrogen from light duty vehicles and engines manufactured during or after model year 1976 shall contain standards which require a reduction of at least 90 per centum from the average of emissions of oxides of nitrogen actually measured from light duty vehicles manufactured during model year 1971 which are not subject to any Federal or State emission standard for oxides of nicrogen. Such average of emissions shall be determined by the Administrator on the basis of measurements made by him."

Provisions for a one-time, one-year extension of these "standards" are provided. Such extensions have been allowed by EPA for CO, HC, and NO_x.

Section 202(a)(1) provides legislative language specific to what we may refer to as nonregulated emissions. Specifically:

> "SEC. 202. (a) Except as otherwise provided in subsection (b) . . .
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> "(1) The Administrator shall by regulation prescribe (and from time to time revise) in accordance with the provisions of this section, standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgement causes or contributes to, air pollution which endangers the public health or welfare. Such standards shall be applicable to such vehicles and engines for their useful life (as determined under subsection (d)), whether such vehicles and engines are designed as complete systems or incorporate devices to prevent or control such pollution."

EPA has, of course, published regulations pursuant to Section 202(b) requiring compliance with emissions standards for CO, HC, and NO_x. Those regulations, entitled "Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines," contains one significant section specific to the issue at hand, namely, 85.004(b)(1)(i), i.e., a new emission-controlled motor vehicle "shall not in its operation or function cause the emission into the ambient air of any noxious or toxic substance that would not be emitted in the operation of such vehicle without such system, except as specifically permitted by regulation."

EPA currently requires registration of additives used in gasoline introduced into interstate commerce. The regulations were promulgated on June 13, 1970, pursuant to provisions of Section 210 of the 1967 Clean Air Act Amendments. These regulations require only that such gasoline additives be registered with EPA prior to use by a fuel manufacturer. No provisions for prohibition, control, or testing are outlined. These registration requirements are principally for information-gathering purposes. At the present time, approximately 325 gasoline additives are registered with the EPA Fuel and Fuel Additive Registration Office (NERC-RTP).

The 1970 Amendments provided for substantial expansion of the fuel and fuel additive registration requirements which were embodied therein in Section 211 is previously discussed. Simply stated, Section 211 provides that the Administrator of EPA may: require registration of fuels and fuel additives (211(a)); require the conduct of tests by manufacturers to determine the effect of fuels and/or fuel additives on emissions, emissions control device performance, public health, and public welfare based upon test protocols established by EPA (211(b)); restrict or prohibit fuels and/or fuel additives having adverse effects as outlined in 211(b), (211(c)); and impose fines for failure to comply with such regulations (211(d)).

Proposed regulations pursuant to Section 211 were prepared by the Fuel and Fuel Additive Registration Office, NERC–RTP, and forwarded to EPA Headquarters early

in fiscal year 1972 (FY 72). After substantial modification in scope and lengthy discussions, the proposed regulations were published as a notice of proposed rulemaking on March 7, 1974. The proposed regulations provided for registration of all additives to motor vehicle gasoline, motor vehicle diesel fuel, and motor vehicle crankcase lubricants, and the registration of motor vehicle gasoline and diesel fuel. EPA's efforts to ascertain effects of additives on catalyst performance and to develop an acceptable effects protocol has been frustrated by the limited availability of catalytic devices and the only recent decision by the automotive industry regarding the systems which will be actually employed in their 1975-model vehicles. Further, it became apparent that if EPA were to assure that all additives which might adversely affect the performance of catalysts were to be identified and restricted from use in the special fuel for such vehicles, the regulations pursuant to Section 211 had to be promulgated with an appropriate lead time to assure conduct of tests by the manufacturers. That time has long since passed.

The Fuel and Fuel Additive Registration program was begun in FY71 subsequent to promulgation of registration regulations requiring registration of gasoline additives published on June 13, 1970, pursuant to provisions set forth in Section 210 of the 1967 Clean Air Act Amendments. The program had a modest beginning (FY71, $60,000) principally aimed at establishment of registration procedures. Beginning with FY72, the program began focusing specially on the substantially expanded provisions of the fuel and fuel additive registration section (211) of the 1970 Clean Air Act Amendments. By mid-1973 it became apparent that certain nonregulated emissions from oxidation catalyst-equipped prototype vehicles were substantially different from those from the then-current motor vehicle population. As a result, a significant shift in program objectives occurred which were initiated in an expanded FY74 program. We will review here a preliminary assessment of the potential public health impact of catalyst-specific emission products and a preliminary review of a possible control option specific to one of these pollutants (sulfates).

This review reflects results obtained not only from the broad multidisciplinary fuel and fuel additive program, but from a number of additional ORD programs which bear on the issue of assessing public exposures to pollutants, public health, and public welfare. EPA research programs are subdivided into the following major components which comprise the overall public health assurance effort: fuel and fuel additive registration, including effects protocol development; fuel surveillance and analysis; emissions characterization and measurement method development; meteorological modelling; toxicology; inhalation toxicology; human studies; control options, including desulfurization of gasoline.

Goals of the Conference

Perspective of the Problem

Session I provides an overview of the potential public health problem specific to nonregulated emission products from oxidation catalysts, specially sulfates. Simply, the session reviews three key elements in such an assessment: emission data, estimated human exposure, and effects of suspended sulfates on human health.

Noble Metals

Session II reviews our current state of knowledge regarding the potential public health risk from the introduction of platinum and palladium, used in oxidation catalysts, into the environment. The review is incomplete owing to the great lack of toxicological, biological, and human effects data available on the subject. The papers presented review the currently available data on toxicology, examine distribution of these metals in biological tissues, present an advanced analytical technique to determine levels in tissues,

and provide preliminary data on the relative toxicity of these noble metals compared to more familiar metals (Pb and Mn).

Emissions and Measurement Methods

Session III reports on the current efforts to measure nonregulated emissions from motor vehicles, principally sulfate aerosols. A major problem in assessing potential public exposures to catalyst-generated sulfates has been the difficulty in obtaining accurate, quantitative emissions data. The session, therefore, addresses the development of SO_2 and sulfate emissions measurement methodology. In addition, ambient SO_2 conversion to SO_4 is discussed. This is of key importance as the sulfate catalyst issue is considered to be a local problem concentrated on and near major vehicular density areas.

We are not concerned solely with emissions from oxidation catalyst-equipped vehicles. The future holds promise of alternate engine technology. What "new" emissions might result from such powerplants is of concern. The final paper in the session reviews currently available information on that subject.

Control Options/Methods

Session IV considers at least two options available for the control of the nonregulated emissions of sulfates from oxidation catalyst-equipped vehicles: particulate emission standards and desulfurization of gasoline.

Particulate emissions measurements have been an extremely difficult task. The papers presented do not address the issue of a particulate standard, rather, they present particulate emission measurement methods which are implicit in considering such a standard. Gasoline desulfurization implications are reviewed. The information provided should provide a preliminary basis for judging the feasibility of such a regulatory action to control sulfate emissions.

The paper on fuel surveillance and analysis provides additional perspective regarding the composition of actual commercial fuels to which advanced vehicular systems will be exposed.

The final paper provides information which is of key importance, not only in this specific effort, but for future public health studies.

Overviews

The final session is intended to provide overviews of the issues discussed during the preceding two days from various perspectives.

As noted earlier in this discussion, this issue regarding sulfate and noble metal emissions has been of concern for over a year. A 955-page document was issued by the Senate Committee on Public Works (Serial 93-H23) covering hearings which were held on November 5 and 6, 1973. The Administrator presented testimony outlining EPA's decision regarding catalysts at those hearings. In summary, these were to permit use of catalysts, to conduct an accelerated and expanded program to ascertain whether our estimates of public exposure are valid, and to consider control options.

The EPA and EPA-funded research reports which are being presented during this symposium represent, quite literally, last week's data. We feel this information is expanded over the data base available last fall upon which the Administrator's decision was made. Other papers from researchers in government and industry are most appreciated as they provide additional perspective from which to view the issue. EPA will be conducting an expanded and accelerated program, as promised by the Administrator, in FY75. A technical review, constructive criticism, and discussion of the current program will be of great assistance to both EPA and affected industries in pursuing meaningful solutions to this and future problems which impact on public health.